Review of Dominion Energy South Carolina, Inc. Modified 2020 Integrated Resource Plan
Docket No. 2019-226-E
Pursuant to Order No. 2020-832

South Carolina Office of Regulatory Staff

April 20, 2021

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Pursuant to Section 58-37-40, South Carolina Code of Laws

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Prepared for the South Carolina Office of Regulatory Staff
by
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Executive Summary

The South Carolina Office of Regulatory Staff ("ORS") provides this Report in review of Dominion Energy South Carolina's ("DESC" or "Company") Modified 2020 Integrated Resource Plan ("Modified IRP") that was filed on February 19, 2021 in Docket No. 2019-226-E. ORS, with the assistance of J. Kennedy and Associates, Inc., evaluated DESC's Modified IRP pursuant to the requirements of S.C. Code Ann. § 58-37-40 ("Section 40") subsection (C)(3) and assessed whether the Company sufficiently addressed the Public Service Commission of South Carolina's ("Commission") Order No. 2020-832 ("Order").

As ordered by the Commission, DESC filed the Modified IRP as a stand-alone document within sixty (60) days of the Order and produced Excel workbooks with supportive data, inputs, and results for each resource plan.

ORS evaluated the Modified IRP pursuant to Section 40(C)(3), which requires ORS "to review the electrical utility's revised plan and submit a report to the Commission assessing the sufficiency of the revised filing" within sixty (60) days of the Company's filing. Except for one item related to Finding of Fact #21 as detailed in this report,[1] ORS determined that the Company sufficiently met the requirements specified in the Order. Additionally, DESC summarily addressed the aspects of the Commission's Order related to the 2021 and 2022 IRP updates and the 2023 comprehensive IRP. The findings of ORS's sufficiency evaluation are detailed in the "ORS Review of DESC's Modified 2020 IRP" section of this Report.

[1] The Company was required to provide generator performance data, equivalent availability factors, and forced outage rates for its generating units, but instead only provided graphs with some results that were based on aggregated data. Further details are provided in the "Existing System Resources" section of this report.

Background of DESC IRP Proceeding

The South Carolina Energy Freedom Act ("Act 62"), signed into law on May 16, 2019, amended the previously established utility IRP statute to include specific requirements that address the utility's peak load and energy forecasts, reliability, alternative resource options, renewable resource options, and retirement of existing resources. Additionally, Act 62 provides substantive and procedural requirements for IRP filings as outlined in S.C. Code Ann. § 58-37-40 ("Section 40").

Pursuant to Section 40, DESC filed the 2020 IRP with the Commission on February 28, 2020. In the IRP, the Company modeled eight (8) different resource plans ("RP") that reflect a range of resource additions and retirements to meet the utility's demand for a study period of fifteen (15) years (2020-2034).[2] DESC also conducted scenario analysis considering various sensitivities of Demand-Side Management ("DSM"), natural gas prices, and carbon dioxide ("CO_2") prices. Furthermore, DESC modeled five (5) additional RPs and sensitivities created using assumptions provided by the South Carolina Solar Business Alliance ("SCSBA").[3]

The Company identified RP2 as the least-cost plan under the base case scenario of $0/ton CO_2 price, base case natural gas prices, and "medium" DSM case.[4] RP2 assumes that there will be no early retirements of existing resources and no new resource additions until 2035, including new solar resources beyond the additions in 2020 and 2021 that are under contract. It further assumes that the new resource additions from 2035 and beyond will be natural gas-fired internal combustion turbines ("ICT").

On July 10, 2020, ORS filed a report ("ORS Report") reviewing DESC's IRP and assessing the compliance with the statutory requirements in Section 40(B)(1) and (2). Through the review, ORS determined that the Company complied with the requirements of Section 40, but identified numerous flaws and provided near and long-term recommendations to be addressed by the Company. ORS proposed that the Company be required to modify the 2020 IRP to incorporate the near-term recommendations and address the long-term recommendations as soon as possible, preferably in the 2021 IRP update, but no later than DESC's next comprehensive IRP in 2023.

In the review of DESC's IRP, ORS found "a significant number of flaws related to input assumptions and modeling methodologies."[5] Specifically, ORS recommended that the Company file a Modified IRP in this proceeding to address a number of ORS's concerns including updates to the Wateree 2 Unit analysis, revisions to the cost assumptions of

[2] DESC 2020 IRP, p.40.
[3] *Id*, Appendix, A.
[4] Bell Direct, p.25.
[5] Hayet Direct, p.4.

generic resource options, and corrections to various errors in DESC's modeling and analyses that was introduced in developing its resource plans.[6] Several intervenors in the proceeding proposed similar and additional modifications to DESC's IRP in their respective testimonies.

The Company filed a revised 2020 IRP ("IRP Supplement") on August 28, 2020 incorporating numerous corrections and adjustments. In his rebuttal testimony, Company witness Neely concluded that, "having made the requested changes, the overall conclusion of the plan has not changed. RP2 has the lowest overall cost to customers under base assumptions of $0/ton CO_2, medium DSM and base gas costs."[7] DESC also provided an updated 'repair or retire' analysis for Wateree 2 Unit, but maintained that the changes did not materially affect the Company's prior conclusions.

ORS reviewed DESC's IRP Supplement and, several minor disputes aside, concluded in surrebuttal testimony that, "[t]he Company's IRP Supplement filed and discussed in DESC witnesses Bell, Neely, and Lynch's rebuttal testimony includes the elements required under S.C. Code Ann. § 58-37-40(B)(1)**."**[8] In review of the IRP Supplement, ORS found that the Company incorporated all but two of ORS's near-term recommendations.[9] In addition, ORS continued to stress that the Company should address ORS's longer term recommendations as soon as possible, but not later than the next comprehensive IRP in 2023.

The Intervenors made additional recommendations to the Company's IRP regarding DSM potential, input assumptions, and modeling methodologies. Southern Alliance for Clean Energy ("SACE") and South Carolina Coastal Conservation League ("CCL") testified that the Company's IRP had not sufficiently met the requirements of Act 62 and recommended that the Commission reject DESC's 2020 IRP and IRP Supplement, and require the Company to file a Modified IRP in this proceeding.[10]

A hearing was held on this docket from October 12 to 14, 2020, where the testimonies of the Company and intervenors were presented for Commission consideration. Section 40(C)(1) of Act 62 prescribes that the Commission "shall issue a final order approving, modifying, or denying the plan filed" by the Company no later than three hundred (300) days after the initial filing. According to Section 40(C)(2), the Commission shall consider if the plan appropriately balances the seven (7) factors outlined in Section 40(C)(2), and shall approve the Company's IRP if the Commission determines that the "proposed

[6] *Id.* at 6-7.
[7] Neely Rebuttal, p.23.
[8] Sandonato Surrebuttal, p.2.
[9] Kollen's Surrebuttal at pp.5-7 discusses an AFUDC issue, and Kollen's Surrebuttal at pp.10-11 discusses a dismantlement/site restoration issue.
[10] Sommer & Hill Surrebuttal, pp. 9&10 respectively.

integrated resource plan represents the most reasonable and prudent means of meeting the electrical utility's energy and capacity needs as of the time the plan is reviewed."[11]

On December 23, 2020, the Commission issued Order No. 2020-832 rejecting DESC's IRP, and required the Company to make modifications to the 2020 IRP, 2021 and 2022 annual updates, and 2023 comprehensive IRP. The Commission ordered the Company to submit a Modified IRP within sixty (60) days and make several changes to the resource plans selection, resource cost assumptions, and natural gas and CO_2 prices consistent with the modifications specified in the Order.[12] Initially, the Commission also instructed DESC to revise the production cost modeling and analysis on an expedited basis and submit the results within thirty (30) days. The Company, however, petitioned for reconsideration to extend the deadline to sixty (60) days to be consistent with that of the Modified IRP, and the Commission approved the request.[13]

Table A-1 in Appendix A of this report contains a summary of the modifications specified in the Order for the Company's Modified 2020 IRP, 2021 and 2022 annual updates, and 2023 comprehensive IRP. Table A-1 cross-references each modification to the corresponding "Findings of Fact" (Section IV of the Order), "Review of Evidence & Evidentiary Conclusions" (Section V of the Order), and "Ordering Paragraphs" (Section VI of the Order). Table A-1 indicates that 26 actions must be performed to meet the requirements of the Order, though only 19 of those must be performed in the Modified 2020 IRP. The rest must be performed for the 2021, 2022 or 2023 IRPs. Table 1, included in the next section, presents the 19 actions that must be performed in the Modified IRP.

Pursuant to the Order and Section 40(C)(3), the Company filed the Modified IRP with the Commission on February 19, 2021. In the revised version, the Company modeled fourteen (14) RPs (compared to the eight (8) RPs that were presented for consideration in the initial version) across twenty-seven (27) scenarios (i.e. three (3) sensitivities each for natural gas prices, CO_2 prices, and DSM).[14] DESC further incorporated in the Modified IRP the resource cost assumptions and a Short-Term Action Plan, as ordered by the Commission.

In the Modified IRP, DESC identified the preferred plan as RP8 (in contrast to the previous selection of RP2) based on eight (8) metrics representing cost effectiveness, carbon reduction, renewable generation, fuel price resiliency, reliability, supply diversity, and risk analysis.[15] RP8 assumes the retirement of DESC's coal units Wateree and Williams in 2028, and adds new solar and battery storage, ICTs, and Combined Cycle ("CC") units

[11] Section 40(C)(1) sets forth the standard of review and Section 40(C)(2) sets forth the factors.
[12] The Order, Section VI - Ordering Paragraphs, p.89.
[13] Commission Order No. 2021-94.
[14] Modified IRP, p.48.
[15] *Id.* at 8.

to meet capacity needs. The Company also indicated that the "expected case scenario" (unlike the "base case scenario" in the original IRP) would include the high DSM, $12/ton CO_2, and low natural gas price assumptions.[16]

[16] *Id.* at 75.

ORS Review of DESC's Modified 2020 IRP

ORS conducted a review of the Company's Modified IRP in accordance with Section 40(C)(3) which states:

> Within sixty days of the electrical utility's revised filing, the Office of Regulatory Staff shall review the electrical utility's revised plan and submit a report to the commission assessing the sufficiency of the revised filing.

Accordingly, the objective of this report is to evaluate the sufficiency of DESC's Modified IRP in meeting the requirements of the Order. To achieve this, ORS reviewed the Modified IRP along with the worksheets provided by the Company, and examined the Company's adjustments to input assumptions, modeling methodologies, and analysis of results. ORS also participated in DESC's stakeholder engagement meetings that were held on February 16 and April 12, 2021.

Table 1 lists the Commission's requirements that must be addressed in the Company's Modified IRP in the current proceeding[17] nineteen (19) Action Items in total, and indicates whether they have been sufficiently addressed by the Company. Except for one item related to Finding of Fact #21 (Action Item 23 in Table 1), ORS determined that the Company sufficiently met the requirements specified in the Order. Note that Table A-1 in Appendix A cross references these Action Items to their respective Findings of Fact included in the Commission's Order.

Table 1

Action Item[18]	Summary of Modifications Required by Commission Order No. 2020-832	DESC Modified IRP Section	ORS Sufficiency Report Section	ORS Determination
1	Conduct an Ongoing Stakeholder Engagement Process	Integration of the IRP into Utility Planning (Pg. 86)	Other Considerations - Stakeholder Process	Sufficient
3	Model Additional Set of Resource Plans	Resource Plan Analysis - Resource Plan (Pg. 48)	Resource Planning	Sufficient
4	Report about Wateree Outage	Appendix E (Pg. 108)	Existing System Resources	Sufficient
7	Improve Cost Assumptions for Generic Resource Options: Flexible Solar PV PPA	Resource Plan Analysis - Resource Plan (Pg. 48)	Generic Resource Options	Sufficient

[17] The 19 items found in Table 1 are a subset of the items found in Table A-1 of Appendix A.
[18] Each "Action Item" listed in Table 1 refers to the corresponding "Action Item" in Table A-1 of Appendix A.

Action Item[18]	Summary of Modifications Required by Commission Order No. 2020-832	DESC Modified IRP Section	ORS Sufficiency Report Section	ORS Determination
8	Improve Cost Assumptions for Generic Resource Options: Battery Storage System	Resource Plan Analysis - Meeting the Base Resource Need (Pg. 47)	Generic Resource Options	Sufficient
9	Improve Cost Assumptions for Generic Resource Options: Solar & Battery Escalation Rates	Resource Plan Analysis - Meeting the Base Resource Need (Pg. 47)	Generic Resource Options	Sufficient
10	Improve Cost Assumptions for Generic Resource Options: ICT	Resource Plan Analysis - Meeting the Base Resource Need (Pg. 47)	Generic Resource Options	Sufficient
11	Revise Winter Solar Capacity Value in Production Cost Modeling	Appendix F & G (Pgs. 113-143)	Reserve Margin Planning	Sufficient
12	Revise Solar Integration Costs in Production Cost Modeling	Resource Plan Analysis - Meeting the Base Resource Need (Pg. 47)	Generic Resource Options	Sufficient
13	Include Simple Quantitative Risk Analysis	Resource Plan Analysis - Mini-Max Regret & Cost Range Analysis (Pgs. 72-74)	Resource Planning	Sufficient
16	Conduct Wider Range of Gas & CO_2 Prices	Resource Plan Analysis - Emissions, DSM and Fuel Sensitivity (Pg. 50)	Natural Gas and CO_2 Price Forecasts	Sufficient
17	Conduct "Rapid Assessment" To Study Achievability of DSM	Appendix D (Pg. 95)	Demand Side Management	Sufficient
18	Provide Action Plan to Complete a Comprehensive DSM Evaluation	Demand Side Management - Action Plan for Comprehensive DSM Evaluation (Pg. 43) Short-Term Action Plan - Demand-Side Management (Pg. 84)	Demand Side Management	Sufficient
21	Include Customer Affordability & Bill Impacts as an Analysis Criterion	Resource Plan Analysis - Rate and Bill Impacts (Pg. 78)	Resource Planning	Sufficient
22	Discuss Current & Potential State/Federal Environmental Regulations	DESC's System and Service - DESC's Current Generation (Pgs. 20-22)	Existing System Resources	Sufficient

Action Item[18]	Summary of Modifications Required by Commission Order No. 2020-832	DESC Modified IRP Section	ORS Sufficiency Report Section	ORS Determination
23	Include Reliability Metrics and Generator Performance	Resource Plan Analysis - Reliability Analysis (Pg. 67) DESC's System and Service - DESC's Current Generation (Pg. 17)	Existing System Resources	Insufficient
24	Include Information on Storm-Related Impacts	Storm Response Plan (Pg. 48)	Existing System Resources	Sufficient
25	Competitive Procurement of Flexible Solar PV PPA	Resource Plan Analysis - Resource Plan (Pg. 48)	Generic Resource Options Other Considerations - Competitive Procurement	Sufficient
26	Include a Three-Year Action Plan	Short-Term Action Plan (Pg. 82)	Other Considerations - Action Plan	Sufficient

The following sections of this report provide ORS's assessment of whether the Company's Modified IRP sufficiently addressed the Commission's requirements in the Order. ORS also discusses the changes that DESC proposes to make for the 2021 and 2022 IRP updates and the 2023 comprehensive IRP, which was also required by the Commission's Order.

Load and Energy Forecast

The Company updated the load (peak demand) and energy forecasts from the original 2020 IRP. Table 2 compares the two (2) sets of forecasts, which are not significantly different.

Table 2

Original 2020 IRP

	Annual Sales GWH	Peak Demand Summer MW	Peak Demand Winter MW
2020	24,003	4,816	4,891
2021	24,091	4,847	4,924
2022	24,029	4,879	4,955
2023	24,097	4,905	4,964
2024	24,092	4,916	4,992

Modified 2020 IRP

	Annual Sales GWH	Peak Demand Summer MW	Peak Demand Winter MW
2021	23,937	4,814	4,939
2022	24,034	4,855	4,975
2023	24,215	4,893	5,002
2024	24,348	4,915	5,008

2025	24,163	4,941	5,022
2026	24,252	4,967	5,051
2027	24,334	4,993	5,077
2028	24,404	5,019	5,102
2029	24,490	5,041	5,152
2030	24,682	5,090	5,209
2031	24,882	5,146	5,266
2032	25,131	5,201	5,319
2033	25,365	5,256	5,375
2034	25,587	5,309	5,428
Compound Average Growth Rates			
2021-2034	0.5%	0.7%	0.7%

2025	24,403	4,918	5,037
2026	24,555	4,939	5,065
2027	24,696	4,965	5,094
2028	24,807	4,987	5,117
2029	24,934	5,003	5,139
2030	25,042	5,021	5,193
2031	25,274	5,079	5,251
2032	25,539	5,137	5,305
2033	25,843	5,194	5,360
2034	26,137	5,255	5,414
2035	26,460	5,312	5,467
Compound Average Growth Rates			
2021-2035	0.7%	0.7%	0.7%

Table 2 above indicates that by 2034, there is a small increase in Annual Energy Sales (550 GWh), and a small decrease in summer and winter peak demand (54 and 14 MW, respectively), which are not significant.

In the Order, Finding of Fact #12 addressed the Company's load forecasting sensitivity cases. The Order states that the Commission was persuaded by SCSBA Witness Sercy's observations that: 1) the Company's load forecasts used in economic analysis sensitivity cases did not represent a reasonably wide enough set of future load conditions, and 2) the Company did not actually use its load forecast sensitivities but instead used DSM adjustments to create load sensitivity cases in its economic analyses.[19] The Commission's conclusions based on Finding of Fact #12 further states, "[t]herefore, the Commission will require DESC, in its 2022 IRP, to work with stakeholders to develop a wide, but plausible range of load forecasts, and ensure that cost modeling captures each resource plan's capabilities to adapt to load that diverges from the base forecast."[20]

In order to develop a wider range of future load conditions, the Company relied on a new methodology in the Modified IRP to develop low and high load sensitivity cases. The Company evaluated growth rates over a 15-year historic period to gain insights that it used in developing projected growth rates. Based on those insights, the Company determined that it would be reasonable to consider a low growth rate between 0% and 0.25%. Given the strength of the South Carolina economy in recent years, the Company ultimately selected 0.25% for its low growth rate sensitivity case. After considering

[19] The Order, p. 66.
[20] *Id.* at 70.

historic high growth rates over the past fifteen (15) years, which has been as high as 3.4% for a single year, the Company selected 1.7% for its high growth rate sensitivity case.

As stated above, Finding of Fact #12 requires the Company to work with stakeholders to "develop a wide but plausible range of load forecasts", and therefore, the Company's new methodology should be evaluated further in that forum. Finding of Fact #12 also requires that the Company use that wider range of load forecasts in the economic analyses that it conducts for its 2022 IRP Update.[21] Otherwise, there were no other load forecasting requirements that the Company had to address in the Modified 2020 IRP.

Reserve Margin Planning and Solar Capacity Value

The Order has two (2) Findings of Fact that address reliability modeling issues. The first relates to Reserve Margin Planning (Finding of Fact #7) and the second relates to the calculation of the capacity value of solar resources (Finding of Fact #9).

With regard to Reserve Margin Planning, the Commission found that the "Design of Resource Plans to Meet Only Base Reserve Margin Rather than Full Peaking Reserve Margins" was problematic.[22] The Commission noted that the Company did not construct resource plans based on a peaking load requirement, but instead based on a base load requirement. The problem with this, as the Commission notes, is that while the Company did assume it would add resources to meet the peaking requirements, the Company simply assumed that any unfulfilled demand above the base load requirement would be met with short-term purchases, without considering whether those short-term purchases would be economic or not. The Commission ultimately ordered DESC to build resource plans to meet DESC's full peaking reserve margin target. The Commission ordered the Company to begin this practice starting with its 2021 IRP Update and stated:[23]

> It is appropriate for DESC, starting with its 2021 IRP Update, to systematically compare resource options for meeting its peaking reserve margin increment, including all available resources, rather than limiting available resources to a narrow subset.

In the 2021 IRP Update, the Company will have to devise a new method to systematically compare resource options in order to meet its full peaking requirement. The Company may require the use of an optimization model for this process, which was another important issue in the proceeding. The Commission addressed the implementation of an optimization model in Finding of Fact 3, which requires:[24]

[21] *Id.* at 70.
[22] *Id.* at 44.
[23] *Id.* at 46.
[24] The Order, p.29.

> ….interested parties in this proceeding in a collaborative process to choose a capacity expansion model for the 2022 IRP Update and future IRP proceedings.

At the hearing, the Company testified it may be possible for it to complete the implementation of the PLEXOS model by the time of the 2021 IRP Update.[25] The Company also stated in the Modified 2020 IRP Report that, "[a]s of early February 2021, the PLEXOS resource optimization software has been configured to model DESC's generation portfolio and system and is undergoing final calibration and quality control testing."[26]

This issue of the optimization model was further addressed by the Commission recently in Order No. 2021-94, issued on March 15, 2021, when the Commission established the timing of when DESC would be required to conduct its stakeholder process to review optimization models. The Commission required the Company "to meet with the intervenors and other stakeholders and provide a report to the Commission within ninety (90) days from the date of this Order".[27]

With regard to the capacity value of solar resources, the Commission's Finding of Fact #9 addresses intervenor assertions that positive capacity value should be attributed to solar resources during the winter period. In its original 2020 IRP, the Company concluded that both existing and incrementally added solar resources would receive zero capacity value during the winter months. The Commission cited witness testimony and determined that solar resources should in fact be given some winter capacity value. The Order states:[28]

> Witness Sercy noted that the Commission ruled on this issue in the recent avoided cost proceeding and rejected DESC's assertion that solar PV has zero winter capacity value and instead adopted an 11.8% capacity value for solar PV that recognizes a modest year-round capacity value for incremental solar on the DESC system.

The Commission's Finding of Fact #9 concludes the Company should "calculate the current ELCC capacity value for solar based on the current level of operational solar on DESC's system, and DESC shall apply that value in its modeling of PV resources "[29] On page 90 of the Order, the Commission also requires DESC to "[c]orrect the incremental

[25] Company Witness Eric Bell testified to this at the Docket No. 2019-226-E hearing. (Tr., pg. 115, ll. 19-23).
[26] DESC Modified 2020 IRP, p. 23.
[27] Commission Order No. 2021-94, p. 8.
[28] The Order, p. 56.
[29] *Id.* at 58.

flexible solar PPA capacity value assumptions to reflect the ELCC value specific to the existing system penetration level of incremental flexible solar PV."[30]

In response to these requirements in the Modified 2020 IRP, DESC used 11.8% as the capacity value for existing solar resources, and conducted an ELCC study to determine the value to use for incremental solar resources. DESC describes the study it performed in Appendix F, in which the Company determined that the capacity value of incremental solar resources should be 4.25%.

Furthermore, the Commission's Finding of Fact #9 also contains the requirement that, "[p]rospectively, Dominion shall work with stakeholders regarding fair inclusion of solar PV's winter capacity value in the 2021 and 2022 IRP Updates. This should be a good-faith attempt to reach a mutually agreeable value to propose for assignment for PV capacity value in the winter."[31] It is appropriate for the Company to work with stakeholders to assess if there would be more appropriate values that could be used in the next IRP.

The Company sufficiently met the Commission's requirements with regard to Reserve Margin Planning and the calculation of the capacity value of solar resources.

Demand Side Management

The Order required DESC to address DSM modeling deficiencies in three (3) ways. First, in Finding of Fact #6, the Commission required the Company to include "DSM as a resource option in the 2021 IRP Update – if achievable – or 2022 IRP Update and future IRPs."[32] Second, the Commission stated that, "in addition to modeling DSM as a resource, a rate rider incentive to reduce the peak demand (or "Shave the Peak") shall be evaluated and shall be documented."[33] Both of these items will be required at least by the time the Company files the 2022 IRP Update, and therefore, it was not necessary for the Company to address these in the Modified 2020 IRP.

The third deficiency was discussed in the Commission's Findings of Fact #13, #14, and #15, and related to the Commission's finding that DESC's initial IRP did not fairly evaluate a high DSM case as required by S.C. Code Ann. § 58-37-40(B)(1)(e), which requires an IRP to fairly evaluate a low, medium, and high DSM case. The Company placed most of its emphasis on its base case because the Commission recently approved the base case DSM portfolio in Docket No. 2019-239-E. The Commission responded that the DSM proceeding was not subject to the requirements of Act 62 and the Company still has the statutory obligation to conduct a fair evaluation of a high DSM case in the IRP. The Commission found that the Company's decision not to evaluate a high DSM case that

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30 *Id.* at 90.
31 *Id.* at 58.
32 The Order, p. 43.
33 *Id*. at 44.

would achieve at least 1% savings was unreasonable and the Commission decided to adopt aspects of SACE/CCL's recommendations, as proposed by Witness Hill. The Commission Order states, "Witness Hill, at the request of Commissioner Ervin, prepared a Late-Filed Exhibit outlining a DSM Action Plan the Company could take to implement his recommendations in a Modified IRP and future IRPs. (Hearing Exhibit. 16.)"[34]

The Commission adopted all five (5) of the SACE/CCL recommendations, also referred to as Steps, except for Step 2. Step 1 required DESC to work with the Advisory Group "to conduct a 'rapid assessment' of the cost-effectiveness and achievability of ramping up its current portfolio to achieve at least a 1% level of savings in the years 2022, 2023, and 2024."[35] Further, in Step 1, DESC was required to include the resulting new portfolio in its refiled IRP, and it was required to include steps it would take to expand its DSM portfolio beyond the 1% energy savings level.[36]

The Commission did not include Step 2, which would have required DESC to evaluate achieving higher levels of energy savings in the Modified 2020 IRP and would have conflicted with the Commission's decision to allow the Company more time to conduct evaluations of achieving higher levels of energy savings.

The Commission adopted Steps 3, 4, and 5. Step 3 requires the Company to work with the EE Advisory Group to review EE profiles and portfolios that would achieve higher levels of energy savings. Step 4 requires the Company to conduct cost effectiveness screening evaluations of portfolios that would achieve the higher levels of energy savings. Step 5 requires the Company to include this comprehensive evaluation in the 2023 IRP. The Commission summarized the requirements as follows:[37]

> In its 2023 IRP, DESC must include a comprehensive evaluation of the cost-effectiveness and achievability of higher levels of savings, including savings levels of 1.25%, 1.5%, 1.75% and 2%. As outlined in step 3 of the late-filed exhibit, this comprehensive evaluation must consider substantive additions and modifications to the Company' existing DSM portfolio. Id. at 3. In implementing this plan, DESC must work with stakeholders, particularly the Advisory Group, and provide opportunities for iterative review, input, and feedback on the Company's analysis and subsequent portfolio development. As part of this presentation in the 2023 IRP, DESC shall include potential incentive options and best practices to achieve the modeled levels of DSM.

The SACE/CCL Late-Filed Exhibit noted that, "[w]hile step 1 assumes the program designs and programs within the portfolio remain the same as the current plan (albeit with

[34] *Id.* at 73.
[35] *Id*. at 75.
[36] *Id*. at 76.
[37] *Id.* at 76.

increased budget and savings targets), the revised portfolio in action step 3 will explicitly include consideration of substantive additions and modifications to the DSM portfolio."[38] Step 5 also required DESC to include an action plan in all IRPs setting forth the appropriate steps to expand DSM programs.[39]

DESC discussed how the Company addressed the Commission's requirements to conduct a Rapid Assessment in Part IV of the Modified 2020 IRP (Step 1), and DESC included a copy of the Rapid Assessment Report in Appendix D. The Company included an action plan in Part IV "for the Company to complete a comprehensive DSM evaluation of the cost-effectiveness and achievability of DSM portfolios reaching 1% and higher savings, including savings levels of 1.25%, 1.5%, 1.75% and 2%, for filing in the 2023 IRP."[40]

At page 42 of its 2020 Modified IRP, the Company, with the assistance of a consultant, ICF, found that some of the recommendations of Witness Hill, as part of the DSM Advisory Group in the rapid assessment, were reasonable and achievable. The recommendations include:

1. Increase outreach to approximately 54,000 units for the Municipal Lighting Program;
2. Double participation in the Neighborhood Energy Efficiency Program; and
3. Move to an opt-out delivery model for Home Energy Reports earlier, in 2021.

The Company found that these recommendations and other analyses (using updated avoided costs) would lead to a 0.73% reduction in energy sales. The Company used the 0.73% reduction in energy sales case as the Medium Case in the IRP. The Company also stated that it provided detailed explanations in a Stakeholder Meeting indicating why the Company believed it could not implement other recommendations of the Advisory Group.[41]

After further meetings and consultation with ICF, the Company determined that while some programs might not be cost-effective, when embedded within a portfolio, DSM programs could be developed that would lead to the overall portfolio being cost-effective and could reach the desired 1% energy savings level. However, the Company was unable to conclude a full DSM assessment in time to meet the Modified 2020 IRP filing deadline, and therefore the Company was unable to include final program details in the filing. The

[38] Docket No. 2019-2226-E, Hill Late-Filed Exhbit, October 21, 2020, p. 3.
[39] Docket No. 2019-2226-E, Hill Late-Filed Exhbit, October 21, 2020, pp. 3-4.
[40] DESC Modified 2020 IRP, p. 10.
[41] *Id.* at 42.

Company did include a generic DSM high case that assumed a 1% energy savings, which sufficiently meets the requirements of the Commission's Order

As mentioned, the Company used the .73% case for its Medium scenario, scaled that case by 90% to achieve the Low scenario, and used a generic 1% assumptions for the High DSM case. The 1% High DSM scenario will require higher customer costs. ICF found that the 1% scenario would increase costs by $60 million in the 10-year potential study.[42] Nevertheless, ICF determined that the 1% scenario would be cost effective.

At page 43 of the Modified 2020 IRP Report, the Company included a DSM action plan and explained the timeline for steps to be taken to comprehensively evaluate higher levels of DSM ranging from 1.25% to 2%, which would be incorporated in the next comprehensive IRP in 2023.

The Company sufficiently met the Commission's requirements in its Findings of Fact #13, #14 and #15 with regard to DSM.

Natural Gas and CO2 Price Forecasts

The Order includes Finding of Fact #12 that concludes there were deficiencies in DESC's natural gas price forecasts, and the Company did not include a broad enough range of CO_2 price forecasts.[43] With regard to natural gas prices, the Commission cited Witness Sercy's testimony, in which he found that DESC's natural gas price sensitivity cases were "skewed towards lower pricing assumptions" and relied on "simple" and "arbitrary, compound annual growth rate assumptions applied to current prices."[44] The Commission also cited to Witness Sercy's testimony in which he found that the Company's $0/Ton and $25/Ton CO_2 cases did not constitute a wide but plausible set of potential CO_2 price cases and the Company's $25/Ton CO_2 case was "substantially lower than even the lowest non-zero CO_2 price projected in AEO 2019."[45]

In light of these findings, the Commission required the Company to use alternative assumptions for natural gas prices and CO_2 costs in the Company's Modified 2020 IRP. Regarding natural gas prices, the Commission stated,

> ….it is far more inappropriate to rely on industry-standard market models than on escalation rates from current data points. The Commission will therefore direct DESC, in the production cost modeling conducted for the Modified 2020 IRP, to use the Annual Energy Outlook ("AEO") low,

[42] *Id*. at 96.
[43] The Order, pp. 70 and 71, discusses natural gas and CO_2 prices, respectively.
[44] *Id.* at 67.
[45] *Id.* at 68.

> reference, and high gas prices described by Witness Sercy in place of DESC's low, base, and high gas prices.[46]

Regarding CO_2 costs, the Commission decided DESC should include a broader range of CO_2 price forecasts, and directed "DESC, in its Modified 2020 IRP and future updates, to use the AEO high CO_2 case described by Witness Sercy in place of DESC's \$25 CO_2 case, in the revised cost analysis."[47]

DESC complied with these requirements as discussed at page 51 of the Modified 2020 IRP. DESC used the U.S. Energy Information Administration's ("EIA") low, reference, and high gas price forecasts from the 2020 EIA Annual Energy Outlook that was published in March 2020. However, the Company stated, "[i]t should be noted that all three forecasts start at levels that are markedly above actual natural gas prices for 2020 and have already displayed a high bias."[48] It would be appropriate for the Company to discuss this further in the Stakeholder Process.

DESC complied with the Order regarding CO_2 as discussed at page 51 of the Modified 2020 IRP, in which DESC modeled three (3) CO_2 price cases, a low \$0/Ton CO_2 case, a medium \$12/Ton CO_2 case, and a high \$35/Ton CO_2 case. In the medium case the Company assumed that CO2 costs would begin in 2030 and obtained the forecast from a forecasting and consulting firm, IHS Markit, which the Company believes to be a reputable firm with a global reputation. The Company included IHS Markit's background description of the \$12/Ton forecast at page 51 of the Modified 2020 IRP, which explains that the forecast was derived based on the assumption that the US rejoins the Paris Agreement and US businesses have a desire for long-term policy certainty, which prompt legislative action in the early 2020s. IHS Markit opined that if federal legislative action does occur, the legislation would result in a modest CO_2 price that would begin in 2030 and would escalate in nominal terms at 10% per year.

As required by the Commission, the Company's high case came from the EIA reference document "AEO 2020 Alternative Policies, Carbon Fees, March 2020." However, DESC stated the following, which also could be discussed in the Stakeholder Process:

> ….[t]he \$35/ton and 7.5% escalation case does not in DESC's opinion represent a likely or possible CO_2 price forecast. Escalation at 7.5% results in a CO_2 price of \$255 per metric ton by 2049. Under the \$35/ton scenario, costs to DESC customers could increase by approximately \$2 billion per year by 2049. This level of customer impact is indicative of impacts that would be experienced throughout the economy from CO_2 prices at this level;

[46] *Id. at* 70.
[47] *Id. at* 71.
[48] DESC Modified 2020 IRP, p. 51.

> therefore, imposing CO_2 prices of this magnitude are not in DESC's opinion reasonably foreseeable.[49]

The Company sufficiently met the Commission's requirements in its Finding of Fact #12 with regard to forecasting natural gas and CO_2 prices.

Existing System Resources

With regard to Existing System Resources, the Order addressed five (5) intervenor concerns that the Commission considered important to evaluate the "….balancing factors outlined in S.C. Code Ann § 58-37-40(C)(1) (Supp. 2019). The Commission is directed to make a finding as to whether the IRP represents the most reasonable and prudent plan, which requires that there is sufficient information in the record for this proceeding to make such a finding."[50]

The first requirement is discussed in Finding of Fact #20, in which the Commission required the Company to supply additional information regarding compliance with applicable environmental regulations. DESC complied with this requirement in the section of the Modified 2020 IRP report entitled DESC's System and Service, beginning at page 20. The Company provides details about how the applicable environmental regulations could affect DESC's generating units. For example, DESC describes the Clean Water Act Section 316b, which is designed to minimize impacts on aquatic life for facilities that have cooling water intake structures, and indicated that DESC has five (5) facilities (Williams, Wateree, Cope, Urquhart and V.C. Summer) that may require modification under the regulation. South Carolina will be required to make plant specific decisions about how to comply with the rule, and DESC is presently conducting studies to support determinations by state regulators. Beyond that, DESC does not currently know what actions will be taken or what the future costs will be. Nonetheless, when DESC conducts detailed retirement studies, an estimate of these costs will need to be included in that analysis.[51]

The second requirement relating to existing resources is discussed in Finding of Fact #21, in which the Commission required the Company to include several years of recent generator performance data. The Commission's conclusion based on Finding of Fact #21 states that DESC is "….required to include several years of recent generator performance data in its IRP, along with generating unit equivalent availability factor, forced outage rate, and other data that DESC reports to the North American Electric Reliability Corporation."[52] The Company complied in part with this requirement in the section of the Modified IRP report titled "DESC's Current Generation," and provided several years of aggregated generator performance data in the form of graphs of historic forced outage rates

[49] *Id.*
[50] The Order, p. 80.
[51] DESC Modified 2020 IRP, p. 20.
[52] The Order, p.81.

categorized by all Fossil Steam Units (IRP Report pg.19) and CC units (IRP Report pg. 24). However, the Company did not provide "generating unit equivalent availability factor, forced outage rate, and other data that DESC reports to the North American Electric Reliability Corporation."

The third requirement relating to existing resources was also discussed in Finding of Fact #21, which ordered DESC to "include in its IRP reporting of storm and hurricane-related outages, including the location of outages, length of outages, and repairs needed to bring customers back online,"[53] so that the Commission may fully evaluate power supply reliability. The Company addressed these requirements in a subsection of the Modified 2020 IRP entitled, "Storm Response" where, in addition to Hurricane Dorian, DESC described three other weather events that caused large-scale power outages (IRP Report pg. 28). In that section, the Company provided details about dates, locations, number of customers affected, and length of average interruptions. The Company states that the availability of generating resources have not been an issue in responding to any recent storms.

The fourth requirement relating to existing resources is discussed in Finding of Fact #5, and requires that the Company "shall provide more information on the [February 2020 Wateree] outage."[54] The Commission listed eight bullet points detailing the information that must be provided. DESC addressed each bullet point in the Modified IRP Appendix E. Wateree retirement study plans were also provided in the Company's Short-Term Action Plan and actions to repair the facility are currently underway.

The fifth requirement is also discussed in Finding of Fact #5. The Commission concurred with ORS and Sierra Club witnesses that a "retirement analysis must be completed as soon as possible."[55] The Commission recognized a retirement analysis as especially important in light of the recent Wateree outage and the impending deadline to retrofit the Wateree and Williams units to meet the ELG deadline.[56] The Company was required by the Commission to incorporate conclusions from the comprehensive coal retirement analysis into the 2022 IRP Update, and to discuss the retirement analysis as part of the stakeholder process. Furthermore, the Company was ordered to detail in the three-year action plan any plans for accomplishing the above tasks. DESC complies with this requirement at page 83 of its Modified 2020 IRP, in which it notes that the retirement analyses for Wateree, Williams, and Cope Stations should be complete in 2022. All three coal stations should have completed studies by the end of the three-year action plan. The

[53] The Order, p. 81.
[54] *Id*. at 40.
[55] *Id.* at 40.
[56] *Id*. at 38.

Company commits to consulting with the Stakeholder Advisory Group throughout the process.

The Company sufficiently addressed the Commission's requirements in its Findings of Fact #5, #20, and #21, except for one part of Finding of Fact #21. With regard to Finding of Fact #21, the Company sufficiently complied with the requirement to provide storm and hurricane-related outage information. However, as discussed, the Company did not provide "generating unit equivalent availability factor, forced outage rate, and other data that DESC reports to the North American Electric Reliability Corporation."[57]

Generic Resource Options

In its Finding of Fact #8, the Commission directed the Company to make modifications to the ICT, solar PPA, and battery storage PPA resource options in response to ORS and SCSBA recommendations.[58] The Company responded by revising the ICT capital cost, solar and battery storage PPA costs, and battery and solar capacity cost escalation rates for those resources that were reflected in the various Resource Portfolios. The Commission, in Finding of Fact #8, also directed the Company to add generic solar and battery storage PPA pricing alternatives, which the Company evaluated in its RP7 and RP8 sensitivity cases.

Table 3 provides a comparison of the installed costs in 2020 dollars and the escalation factors of the generic resource options from the tables found in the Company's Supplemental and Modified 2020 IRPs.

[57] The information is reviewed and discussed before the Commission as part of the Company Annual Review of Base Rates for Fuel Costs S.C. Code Ann. 58-27-865.
[58] The Order at p.17.

Table 3

Comparison of DESC Capital Costs for New Resource Additions				
Resource	**Supplemental 2020 IRP Cost**		**Modified 2020 IRP Cost**	
	2020 $/kW	**Escalation**	**2020 $/kW**	**Escalation**
Solar	$1,151	0.26% (2020-2030) 0.76% (2031-2049)	$1,151	NREL 2020 ATB Annual Escalation
Battery Storage	$1,349	-2.11% (2020 – 2030) -0.62% (2031 – 2049)	$1,349	NREL 2020 ATB Annual Escalation
CC 1-on-1	$1,406	3.75%	$1,406	3.75%
ICT Large Frame (2x)	$496	3.75%	$714	3.75%
ICT Aero (2x)	$970	3.75%	$970	3.75%

The Commission found that the Company's ICT capital cost was too low and ordered the Company to use "industry accepted ICT capital cost assumptions, such as NREL."[59] The Company complied with this requirement and used $714/kW in the Modified IRP compared to $496/kW in the original and supplemental IRP filings. The $714/kW was obtained from the AEO.

The Commission determined that the Company's initial cost for owned battery storage resources was too high, but was satisfied that DESC lowered the cost in the Supplemental IRP and used the same cost in the Modified IRP filings.[60]

With regard to battery storage PPA resources, in Finding of Fact #8, the Commission directed that DESC utilize Witness Sercy's recommended approach to model battery storage PPA costs, and the Commission ordered the Company to rely on the following assumptions:

> The Commission finds that in modeling the cost of battery storage PPAs in the Modified 2020 IRP, DESC shall use the NREL ATB's low storage cost case (including capital and fixed OAM costs) with the same 22% ITC safe harbor assumptions discussed above for solar PV PPAs. DESC shall also adopt Mr. Sercy's recommended approach to modeling battery storage PPA costs, as described herein.[61]

[59] *Id*. at 56.
[60] *Id*. at 17.
[61] *Id*. at 52.

The Commission's reference that "DESC shall also adopt Mr. Sercy's recommended approach" was explained more fully by the Commission in this passage:

> According to Mr. Sercy, a reasonable approach to modeling battery storage PPAs would be to assume a 15-year life, NREL ATB low case nominal capital and O&M costs, no degradation, and after the initial PPA expires, a new 15-year PPA would be added at the capital, O&M, and financing costs for that future year. Mr. Sercy recommend using this approach for purposes of modeling the battery storage PPA included in the RP7-B plan he describes with his recommendations for changes to the 2020 IRP. (Tr.p. 615.16-17.) [62]

The Commission further referenced Mr. Sercy's rebuttal testimony, in which Mr. Sercy stated that he calculated a 2023 battery PPA price of $129.79/kW-year and a 2038 price of $95.28/kW-year. [63] The Company complied with the Commission's requirement concerning battery storage resources by modeling 100 MW of Battery Storage PPAs in scenarios RP7b, RP7b2, and RP7b3.[64] The Company's Battery Storage PPA prices in 2023 and 2038 were a constant value of $101/kW-yr, which is reasonably close to the values that Mr. Sercy calculated.[65]

With regard to solar PPA costs, the Commission found that "DESC's PPA cost assumptions were at odds with real world data and overstated the likely cost of PPAs in South Carolina."[66] Accordingly, in Finding of Fact #8, the Commission directed the Company to perform "additional modeling runs of 400 MW solar at three prices in line with indicative South Carolina pricing: $34/MWh, $36/MWh, and $38.94/MWh."[67] The Company complied with this requirement and developed three alternative versions of RP7: RP7a with 400 MW of solar PPAs added in 2023 at $38.94/MWh, RP7a2 with pricing at $36/MWh, and RP7a3 with pricing at $34/MWh.[68]

While the Company complied with the Commission's requirement to model three separate solar PPA cases at specified prices, there is an inconsistency between the capacity factor that was used to derive the solar PPA cost input that was modeled in the PROSYM data, and the capacity factor associated with the solar profile that was modeled in PROSYM. ORS found the difference in the two capacity factors to be about 10%.

In Finding of Fact #8, the Commission also directed the Company to correct the calculation errors in the escalation or de-escalation of the new solar and battery storage

[62] *Id*. at 51.
[63] *Id*. at 51.
[64] DESC Modified 2020 IRP, pp. 48 and 92.
[65] PROSYM report for case RP7, supplied by DESC with its Modified IRP filing.
[66] The Order at p. 49.
[67] *Id*. at 49.
[68] DESC Modified 2020 IRP, p. 48.

resources identified and described by Witness Sercy. The Company complied with this requirement and used the NREL ATB real dollar costs and then escalated the declining real costs using a 2.5% annual escalation rate. This resulted in a reduction in the capital costs of these solar and battery resources through 2030 and then annual increases thereafter.

In Finding of Fact #8, the Commission also directed the Company to reflect the 22% ITC value in the capital cost of the new owned solar and paired battery storage resources. For cases in which DESC added new owned solar resources or battery storage resources in 2026, the Company used 26% as the ITC value for those resources. For solar or battery storage resources that were added later than that, the Company used 10% as the ITC value for those resources. The Company has sufficiently complied with the Commission's requirements regarding modeling ITC.

In Finding of Fact #9, the Commission directed the Company to use an integration cost assumption of $0.96/MWh for new uncontrolled solar PPAs. The Company complied with this requirement in its production cost modeling analyses.

Resource Planning

This section provides a brief description of the Company's RPs and sensitivities performed in its Modified IRP. The section also compares the resource retirements and additions reflected in the Company's original and supplemental IRPs to the Modified IRP. This Section addresses the Company's selection of RP8 as the preferred RP and the Company's use of risk analyses in providing cost range and minimax regret analyses. It also discusses the Commission's requirements for providing rate and bill impact analyses.

Finding of Fact #4 required the Company to "model a limited set of additional resource plans as specified by SCSBA…"[69] The Company complied with the requirements in the Commission's Order by evaluating fourteen (14) RPs in the Modified IRP, consisting of the eight (8) RPs (RP1 through RP8) reflected in the Original and Supplemental IRPs plus six (6) additional plans as variations of RP7 that stemmed from the Commission's Order.[70] The fourteen (14) plans were evaluated under the three (3) levels of natural gas prices, three (3) CO_2 emission cost prices ($0 per ton, $12 per ton, and $35 per ton), and three (3) DSM cases, a total of twenty-seven (27) different sensitivities and 378 different cases. As noted in other sections of this Report, the Company updated the base forecasts of energy and demand, which DESC used as the starting point in developing the loads with the DSM sensitivities. As noted in the preceding section of this Report, the Company also updated the capital costs of its new ICT, solar, and battery storage generic resource options and the future escalation rates and methodologies.

[69] Order at 16.
[70] DESC Modified 2020 IRP, p. 48.

The Company's fourteen (14) RPs incorporate a wide range of options that include:

- Three (3) different retirement plans.
- Additional renewables in ten (10) of the RPs.
- 973 MW of existing solar PPAs in all RPs.
- Approximately 1,900 MW of solar and 700 MW of storage in RP8.
- Three (3) different sized solar generators were modeled at 400 MW, 100 MW and 50 MW.
- Two (2) different types of solar generation were modeled, Company-owned and PPAs with third party owners, including three (3) different pricing alternatives.
- Three (3) different gas generators were modeled—CC, Frame ICT, and Aero ICT.

The Company's RPs are described in greater detail in the Modified 2020 IRP Report. Appendix G contains the yearly expansion plans for each of the alternative resource plans. The levelized annual costs of the RPs and sensitivities are significantly different in the Modified IRP compared to the original and supplemental IRPs due to the changes ordered by the Commission. Some of the RPs in the Modified IRP incorporate changes in existing resource retirements and new resource additions compared to the similarly named RPs in the original and supplemental IRPs. Most notably, RP8 in the Modified filing reflects the elimination of 100 MW of new solar from 2029 and 2048, the delay of 131 MW of new ICTs by one year to 2036, 2038, and 2040, the addition of 100 MW of new battery storage in 2031, 2033, 2034, and 2047, and the delay of 100 MW of new battery storage by one year to 2042, 2044, 2046.

The Company selected RP8 as the preferred RP In RP8. In RP8, the Company assumes Wateree and Williams will retire in 2028 and replaces the capacity with a 553 MW 1-on-1 CC plant and 523 MW of ICTs that same year. The Company assumes that dual fuel capability will be eliminated at Cope in 2030 and Cope will burn only natural gas thereafter. The Company assumes that it will add new 100 MW solar resources, new 100 MW battery storage resources, and 131 MW ICT resources in subsequent years. In RP8, the Company assumes that it will add 1,900 to 2,000 MW of solar and 700 MW to 900 MW of storage. RP8 is also the lowest carbon plan.

The levelized annual costs of the RPs and sensitivities vary widely based on the assumptions utilized. The selection of the least cost RP depends on the selection of the assumptions and the weight given, or risk assigned, to each outcome over the ranges of assumptions. The Company selected RP8 as the least cost RP on a risk-adjusted basis, although RP8 is the most expensive or one of the most expensive RPs under all of the

\$0 CO_2 sensitivities and under the \$12 per short ton CO_2 and high natural gas sensitivity cases. The Company provided tables comparing the levelized annual costs of the RPs under varying assumptions to enable such a comparison (pages 54 – 57).

The Company was criticized in the original 2020 IRP for not including appropriate risk analysis of the proposed plans, including by SCSBA Witness Sercy who argued for the Company to include cost ranges and a minimax regret analysis. Witness Sercy noted more complex risk adjustment mechanisms are available and appropriate, but suggested these simpler metrics given the time constraints of the Modified IRP. The Commission agreed with Witness Sercy, and in Section V of its Order the Commission's Findings of Fact #10 and #11 required the Company to include cost range and minimax regret analyses in the Modified 2020 IRP, and the Commission found that "a stakeholder process is an appropriate venue for further refining the risk-adjusted metrics that DESC should apply to future IRPs."[71] The Commission required consideration of more refined and sophisticated risk-adjusted metrics in the 2022 IRP update. The Company complied with the requirements on pages 72 and 73 of the Modified 2020 IRP, where the Company discussed the minimax regret and cost range analyses performed. The Company's preferred RP8 plan scored best in both metrics. DESC notes the shortcomings of these metrics, namely that they treat each scenario as equally likely. The Company lists "Risk metrics & industry best practices" as one of the topics for a future stakeholder meeting; accordingly, this and other shortcomings can be addressed at that point. DESC sufficiently addressed the Commission's risk analysis requirements.

One additional item that relates to resource plans and sensitivities, which the Commission discussed in the Order section entitled "Balancing of Act 62 Factors,"[72] in Finding of Fact #19, addressed SACE/CCL Witness Sommer's recommendation that "the Commission require that DESC calculate the rate and bill impacts of its various portfolios in the IRP, rather than just a levelized NPV of revenue requirements. (Tr. p. 476.17, l. 17 — p. 476. 18, l. 15.)"[73] The Commission ordered DESC to provide this information in the Modified IRP and in future IRPs.[74] The Company provided this information and explained its calculation as follows:

> This analysis uses the same incremental cost data that was used in preparing the Levelized Cost for each resource plan. Rate impacts were computed using the load growth forecasts and fuel cost forecasts embedded in the various scenarios. The analysis then combined that data with data concerning existing rates and cost of service allocators between rate classes. This made it possible to compute the impacts of resource plans on the monthly bill for a typical 1,000

[71] Order at 64.
[72] *Id.* at 77.
[73] *Id.* at 78.
[74] *Id.* at 77.

> kWh residential customer for each year from 2020 to 2034. The rate impact analysis is not a forecast of future rates, but a calculation for comparative purposes of the incremental dollar impact of each resource plan on a residential customers' monthly bill, all other things being equal. The analysis does not attempt to model other changes to residential rates or bills.[75]

The Company further explained that the difference in the Levelized Cost metric and the Retail Rate Impact analysis measure is that the former measures costs over a 40-year period, while the latter assesses impacts over a 15-year period to determine impacts that immediately affect customers. Nevertheless, the Company explained that 40-year impact assessments are:

> [T]he more appropriate impacts to be considered in evaluating and ranking resource plans. Long-lived generation assets reduce costs and provide customer benefits over decades. A 40-year period more closely matches the useful lives of those assets and ensures that the full cost and benefits of investing in them are captured [in] the analysis.[76]

The Company provided tables containing the rate and bill impacts on page 79-80 of the Modified IRP Report and in Appendices M and N.

The Company sufficiently addressed the Commission's requirements regarding the Company's RPs and sensitivities modeled, resource retirements and additions, selection of its preferred plan, risk analysis, and customer rate and bill impacts.

Transmission System Planning and Investment

Although the Commission did not specifically order the Company to make any changes to the Transmission System Planning section of the IRP, Act 62 does require that all utility IRPs include "a summary of electrical transmission investments planned by the utility." To that end, the Modified 2020 IRP includes a "Transmission Plans and Planning" section on page 27 that addresses transmission projects and plans at system-wide, regional, and interconnection-wide levels. The Company lists the planned transmission projects, their expected completion dates, and recently completed transmission projects. DESC also lists the joint transmission planning studies completed with regional neighbors.

Distribution Resource and Integrated System Operations Plans

The Company was not ordered to make any changes regarding its Distribution and Integrated System Operations Plans. While the Act 62 statute does not mandate the inclusion of this information, utilities are encouraged to include this information in the IRPs. The Company discusses modernization efforts through Smart Switching and

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[75] DESC Modified 2020 IRP, p. 78.
[76] DESC Modified 2020 IRP, p. 78.

Advanced Metering Infrastructure, and issues concerning the proliferation of distributed generation in the Modified 2020 IRP Report.

Other Considerations

Peaking Generation Replacement Plan

After filing the Modified 2020 IRP on February 19, 2021, the Company filed a request in Docket No. 2021-93-E on March 10, 2021, seeking permission to replace "10 existing combustion turbines and one existing steam turbine-generator set with five modern aeroderivative-type turbines across the three sites."[77] The units include Bushy Park CT A and B, Parr CT 1-4, Urquhart CT 1-4, and Urquhart Steam Unit 3. The Company mentioned its intention to evaluate the replacement of some of the CTs in the Short-Term Action Plan that was included in the Modified 2020 IRP Report (page 84), however, DESC provided no indication that, in a matter of a few short weeks, the Company would actually be ready to request permission to implement the "peaking generation replacement plan." The only unit considered for retirement in the Company's modeling analyses in the Modified 2020 IRP was the Urquhart Steam Unit 3, and the Company provided no indication it was ready to recommend retirement of the unit. In the filing seeking permission to implement its peaking generation replacement plan in Docket No. 2021-93-E, the Company states that if the Commission approves the plan, the Company will "include the modeling of the replacement peaking generation in its 2021 Update to its Modified 2020 IRP…."

ORS will conduct a comprehensive review of the Company's request and advise the Commission of its findings. ORS filed an initial set of discovery with the Company on March 29, 2021, and filed a letter with the Commission on April 1, 2021 in Docket No. 2021-93-E.

Competitive Procurement of Renewable Resources

In Finding of Fact #22, the Order stated that the Company and intervenors provided "substantial discussion of the potential for competitive procurement of renewable resources."[78] SCSBA Witness Sercy argued that the Company should consider adding renewable resources before the expiration of the ITC. As such, Witness Sercy recommended that the Company undertake an expedited competitive procurement of solar resources that would award contracts in Q3 2021 in order to qualify for the ITC. The Commission found Witness Sercy's recommendations to be reasonable and ordered the Company to conduct, as a first step in the procurement process, a Near-Term Solar production cost modeling analysis to be completed within thirty (30) days. However, on December 27, 2020, a two-year extension of the solar ITC (at the 26% level) was signed

[77] https://dms.psc.sc.gov/Attachments/Matter/c74f4a04-659e-45b1-8d8a-edffbe0fe203
[78] The Order at p. 82.

into law as part of the Federal omnibus spending and COVID-19 relief bill. Recognizing that if a competitive solicitation process were ultimately required, the urgency was relieved by the ITC extension, and therefore, the Company requested a 30-day extension of the production cost modeling analysis. The Commission granted the Company's request on March 15, 2021 in Order No. 2021-94 and allowed the Company to complete and report about the required production cost modeling analyses at the same time that it filed the Modified 2020 IRP.

Short Term Action Plan

Finding of Fact #23 pertains to the Short-Term Action Plan. Several witnesses, including ORS, were concerned with the lack of a Short-Term Action Plan in the Company's original IRP. Witnesses noted that the Company's lack of a Short-Term Action Plan in the original IRP was contrary to standard industry practice, and lessens the Commission's and Intervenors' understanding of how the Company will implement its long-term plans. The Commission agreed and required the Company to include a three-year action plan in the Modified IRP. The plan was required to address "at a minimum, the DSM Action Plan…; the Company's process for selecting a capacity expansion model, in collaboration with stakeholders; the Company's plans to conduct retirement studies required….; [and] any actions related to competitive procurement of renewable energy resources."[79] DESC was also required to explain how the Short-Term Action Plan integrates the IRP into other Company planning processes. The Company includes a three-year action plan covering years 2021-2023 in the Modified 2020 IRP beginning on page 82. The Short-Term Action Plan includes discussions on current resource evaluation, retirement planning, CT modernization, DSM, capacity expansion model selection and stakeholder engagement. The Short-Term Action Plan is followed by a section on page 88 describing how the IRP is integrated into other Company planning processes. Results from the 2020 IRP will be used to calculate avoided energy and capacity costs in PPAs negotiations and future Commission proceedings, plan for new generation and transmission projects, and justification for future capital expenditures. The Company has sufficiently fulfilled the requirements set forth by the Commission regarding the Short-Term Action Plan.

Stakeholder Process

Finding of Fact #2 concerns the Stakeholder process. In the Order the Commission found numerous areas in which the Company must solicit stakeholder feedback in future IRP Proceedings. The Commission required the Company to begin a process of engaging stakeholders on a range of topics important to the IRP process. Specifically, the Company is required to convene stakeholders' meetings to discuss the selection of its DSM, capacity expansion software, risk metrics, and coal retirement analyses. The Company is required to report on the utilization and composition of Stakeholder meetings and provide

[79] *Id*. at p. 88.

regular, semi-annual updates on those meetings. The Company described the progress in meeting this requirement on page 87 of the Modified 2020 IRP. The first stakeholder meeting was held on February 16, 2021, and the second was held on April 12, 2021, with invitees from ORS and other state agencies, industrial, commercial, and residential stakeholders, and other groups, representing a broad array of interests and backgrounds. DESC plans to hold these meetings every 6-8 weeks in the months leading up to an IRP filing or update. Some of those topics discussed in the first meeting included model selection, risk analysis, generator retirement analysis, and CO_2 and Commodity price scenarios. The Company has made progress toward meeting the requirement and plans to consistently engage stakeholders in the ongoing process.

Appendix A

Table A-1

Action Item	Summary of Modifications Required by Commission Order No. 2020-832	Section IV - Findings of Fact[80]	Section V - Evidence and Evidentiary Conclusions	Section VI - Ordering Paragraphs	Adoption Timeline
1	Conduct an Ongoing Stakeholder Engagement Process	2	A (Pgs. 23-24)	7.a. - 7.e.	Modified IRP
2	Adopt capacity expansion modeling	3	B (Pg. 29)	7.a. and 8.a.	2022 IRP Update
3	Model Additional Set of Resource Plans	4	C.1. (Pgs. 33-34); C.2. (Pgs. 39-40)	6.a.	Modified IRP
4	Perform Coal Retirement Analysis, Model Coal Retirement as a Resource Option, and Report about Wateree Outage	5	C.2. (Pgs. 39-41)	7.c. and 8.i.	2022 IRP Update (Coal Retire) and Modified IRP (Wateree)
5	Model DSM and Purchased Power as Resource Options	6	C.3. (Pgs. 43-44)	8.e.	2022 IRP Update
6	Build Resource Plans to Meet Peaking Reserve Margin	7	C.4. (Pg. 46)	8.f.	2022 IRP Update[81]
7	Improve Cost Assumptions for Generic Resource Options: Flexible Solar PV PPA	8	D.1. (Pgs. 49-50); F. (Pgs. 85-86)	6.b.i	Modified IRP
8	Improve Cost Assumptions for Generic Resource Options: Battery Storage System	8	D.2. (Pgs. 51-52)	6.b.ii	Modified IRP

[80] Additional Finding of Facts were included in the Order, but were not included in Table A-1 because they are non-specific and do not require the Company to perform actions that affected the IRP results. However, they are discussed within this report:

- Finding of Fact #1: DESC should file a Modified IRP as a standalone document within 60 days of the Order.
- Finding of Fact #16: DESC failed to balance all the factors outlined in Section 40(C).
- Finding of Fact #18: DESC failed to demonstrate that the Company's preferred plan, RP2, represents the most reasonable and prudent plan.

[81] The Order requires the Company to adopt this item at three different timelines: Finding of Fact #7 (p. 17) states that the Company adopt this item in its Modified 2020 IRP, Section V of the Order (p.46) conlcudes that the Company adopt this item in its 2021 IRP Update, and Section VI (p.93, 8(f)) states that the Company adopt this item in its 2022 IRP Update.

Action Item	Summary of Modifications Required by Commission Order No. 2020-832	Section IV - Findings of Fact[80]	Section V - Evidence and Evidentiary Conclusions	Section VI - Ordering Paragraphs	Adoption Timeline
9	Improve Cost Assumptions for Generic Resource Options: Solar & Battery Escalation Rates	8	D.3. (Pg. 53)	6.b.vi	Modified IRP
10	Improve Cost Assumptions for Generic Resource Options: ICT	8	D.4. (Pgs. 55-56)	6.b.v	Modified IRP
11	Revise Winter Solar Capacity Value in Production Cost Modeling	9	D.5. (Pg. 58)	6.b.iii	Modified IRP
12	Revise Solar Integration Costs in Production Cost Modeling	9	D.6. (Pgs. 60-61); F. (Pg. 86)	6.b.iv	Modified IRP
13	Include Simple Quantitative Risk Analysis	10 & 11	E.1. (Pg. 64)	6.c.	Modified IRP
14	Include Comprehensive Risk Analysis	11	E.1. (Pg. 64)	7.b. and 8.g.	2022 IRP Update
15	Conduct Wider Range of Load Forecasts	12	E.2. (Pgs. 69-71)	8.b.	2022 IRP Update
16	Conduct Wider Range of Gas & CO_2 Prices	12	E.2. (Pgs. 69-71)	6.b.vii, 8.c., and 8.d.	Modified IRP
17	Conduct "Rapid Assessment" To Study Achievability of DSM	13	E.3. (Pgs. 74-76)	6.d and 6.e.	Modified IRP
18	Provide Action Plan to Complete a Comprehensive DSM Evaluation	15	E.3. (Pgs. 74-76)	6.f.	Modified IRP
19	Complete & Include a Comprehensive DSM Evaluation	14 & 15	E.3. (Pgs. 74-76)	9	2023 IRP
20	Include Diversity of Supply Resources as an Analysis Criterion	17	E.1. (Pg. 64)	8.h.	2022 IRP Update
21	Include Customer Affordability & Bill Impacts as an Analysis Criterion	19	E.4. (Pgs. 80-82)		Modified IRP
22	Discuss Current & Potential State/Federal Environmental Regulations	20	E.4. (Pgs. 80-82)		Modified IRP
23	Include Reliability Metrics and Generator Performance	21	E.4. (Pgs. 80-82)		Modified IRP
24	Include Information on Storm-Related Impacts	21	E.4. (Pgs. 80-82)		Modified IRP

Action Item	Summary of Modifications Required by Commission Order No. 2020-832	Section IV - Findings of Fact[80]	Section V - Evidence and Evidentiary Conclusions	Section VI - Ordering Paragraphs	Adoption Timeline
25	Competitive Procurement of Flexible Solar PV PPA	22	D.1. (Pgs. 49-50); F. (Pgs. 85-86)	6.b.i	Modified IRP
26	Include a Three-Year Action Plan	23	G. (Pg. 88)	11	Modified IRP